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extremely slight. What we require, however, in such investigations are actual measurements by micrometrical appliances.

Since writing the above I have carefully looked over the four last volumes of my drawings of solar spots, deposited in the library of our Society, extending over a period of ten years, from 1864 to 1873 inclusive, and find that during that period, whilst there are eleven instances fairly adverse to any phenomena of the foreshortening in question, there are seven instances fairly in its favour, but generally only to a slight degree.

With regard, however, to the very marked divergence between Dr. Wilson's observations of the last century and those of both Mr. Ranyard, Father Perry, and myself on this present occasion, we shall probably come to the conclusion that there are different classes of spots, and which, amongst other peculiarities, manifest very different degrees of profundity, as well as of general form, permanency, and even colour, as was observed in the month of April last by Mr. B. J. Hopkins, as well as on other occasions by Mr. Lockyer, myself, and, I doubt not, other observers.

Lastly, it may be as well to remember that the Sun's vastly deep and diaphanous atmosphere (whose existence is evinced by the very considerable diminution of the Sun's luminosity all round the margin of that luminary) must have some effect in modifying the appearances of all features situated on and near the limb. The effect of the refraction of the rays proceeding from the Sun's surface would be to cause somewhat more than half the disc to be visible to an observer on the Earth, and hence to retain solar features in sight which would otherwise have passed out of view; and also to flatten and level prominences standing on the limb, and possibly also to slightly increase the apparent width of the outer side of a penumbra somewhat more in proportion than the inner side, but from a different cause to that assigned to this by Dr. Wilson.

It was Professor Challis, I think, who many years ago drew attention to this modifying of objects on the Sun's limb, by virtue of the refraction exerted by the solar atmosphere.

The Fourth Satellite of Jupiter during Superior Conjunction on the Night of April 5, 1886. By Edmund J. Spitta.

A frequent explanation of the anomalous appearance which the satellites of *Jupiter* sometimes present during transit, but which is scarcely admitted to be adequate or satisfactory, is based upon the suggestion that the illumination of the hemisphere of the satellite then presented to the Earth is not equally distributed; and this explanation has been still further complicated by the suggestion that owing to the period of rotation possibly corresponding with that of revolution, this particular hemisphere is only seen at the time of transit, and that then the effect of the unequal illumination is aggravated by the contrast with the bright disk of *Jupiter*.

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It seemed to me desirable, therefore, to call attention to the opportunity of examining the satellite at a time when the same hemisphere—neglecting libration—must necessarily be presented to the Earth as when the transit is in progress, and when the phenomenon would not be complicated by the background of *Jupiter's* disk, on which it is usually exhibited. Such opportunities of varying the condition under which the satellite can be seen occur but rarely, as a reference to the *Nautical Almanac* clearly shows, and I regret that the observations yet published have not been more numerous or definite. I present here those that have come under my own notice, or have been forwarded to me in consequence of the appeal I made to those interested in the subject.

All correspondents complain of the badness of the weather; hence my earliest note is at 8 P.M., when the satellite was to the north of its primary at its following limb. It was then bluish, and seemed scarcely brighter than the neighbouring portion of *Jupiter*. Mr. Denning thought it appeared as if veiled around its periphery and brighter at its centre. This was with his 10-inch Reflector; power, 252.

An hour later it was closer to *Jupiter*—almost touching it; it then appeared fainter than ever; and when compared with the nearest satellite, which was the first, it was found to reflect only one-fourth of the light of that satellite. (This observation was made, I am informed, with a photometer constructed after the plan suggested by Prof. Pritchard.) A friend and myself made our earliest observation at 10.30 P.M., and we both came to the conclusion that the size of the satellite appeared much reduced, and later still we thought its light was also diminished to about two-thirds of its usual quantity; but of course no definite allowance could be made for the effect of the adjacent luminary. I may add that I have witnessed a great number of transits of *Jupiter's* satellites, and since this observation have examined others, to note if the light of the other satellites when nearing transit was reduced as much as that of the fourth appeared to be at the time above mentioned, and I have come to the conclusion—however imperfect such eye-estimations may be—that they are not.

By a second photometric comparison between the light of the fourth with that of the first at 11.30 P.M. I am informed it was found that the reflected light had become increased, being then only one-third less than the comparison satellite; but whether this was due to the altered position of the satellite or to its reflective power having become greater, I am not in a position to state. Bad weather prevented any further observations either of the satellite or of its shadow.

Most observers reported fair definition. The instrument used here was the 10-inch Calver Reflector; power, 150.

Ivy House, Clapham Common,
1886, *April.*

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